MATTERS ARISING

Disruption of meteoritic iron parent bodies

THE discovery by Clarke *et al.*[1] of preterrestrial shock polymorphism (ε structure) and shock-induced diamond in Allan Hills A77283 has implications for the process by which the parent body of this meteorite disrupted.

The internal metallographic structures of meteoritic iron seem to require well insulated parent bodies of 10–100 km size[2,3], whereas iron meteorites typically fall to Earth as bodies of 10–100 cm with occasional crater-forming masses of perhaps up to 100 m size. However, of the 70 or so IA irons (excluding A77283) only 3 show sufficient signs of mechanical damage to produce the ε structure[4]. Of these three Cañon Diablo is well known to contain diamond, but is a crater-forming mass and the indications are that its shock effects arose during Earth impact. Cranbourne and Magura are showers, not associated with known craters, and are badly corroded. Magura has been reported to contain diamond[4].

In the absence of ablative heat effects it is difficult to say whether the shock effects in Cranbourne and Magura are pre-terrestrial or not, but the Allan Hills A77283 observations now open up the possibility that they may be.

Thus, the disruption of the IAB parent body seems to have been effected with major damage (ε) to only two or three of the resulting fragments. By contrast, most of the 130 or so members of the IIIAB group show ε structures or shock heating effects.

It is therefore easy to accept a collision process for the disruption of the IIIAB parent body but the marked absence of shock polymorphism in the IAB irons is puzzling. One possibility is that the distribution of non-metal phases (silicates, sulphides) was different in the two parent bodies and allowed damage to be more concentrated in the non-metal portion of the IAB parent. The new evidence on A77283 and the possible pre-terrestrial character of shock effects in Cranbourne and/or Magura now indicate that collision was involved in the disruption of the IAB parent body. The nature of the assumed non-metal portion of the IAB parent which bore the brunt of collision damage remains unresolved but the position of the shocked diamondiferous ureilites might be reconsidered in this context.

H. J. AXON

Metallurgy Department,
University/UMIST,
Manchester M1 7HS, UK

1. Clarke, R. S. Jr, Appleman, D. E. & Ross, D. R. *Nature* **291**, 396–398 (1981).
2. Wood, J. A. in *Asteroids* (ed. Gehrels, T.) 849–891 (University of Arizona Press, 1979).
3. Goldstein, J. I. & Axon, H. J. *Naturwissenschaften* **60**, 313–321 (1973).
4. Buchwald, V. F. *Handbook of Iron Meteorites* (University of California Press, 1976).

Fish versus zooplankton predation in lakes

FISH predation has traditionally been viewed as one of the most important factors regulating zooplankton community structure in freshwater lakes[1,2]. Recently Lane[3], approaching the problem from a different point of view, has conducted comparative studies of vertebrate and invertebrate predation in a temperature freshwater lake with numerous species of zooplanktivorous fish and concluded that piscine predators "probably have little effect on the myriad of interactions among most zooplankton species". Lane's comparative approach for studying predation in aquatic systems is commendable. However, we question her conclusion that fish were unimportant in affecting the zooplankton community which she studied because the following methodological problems of her work would result in a gross underestimate of the relative impact of fishes.

(1) Fish biomasses were poorly estimated. Estimates of absolute densities of fish cannot be made with gill nets unless ancillary studies are conducted (that is, mark and recapture). Additionally, gill nets are not available in mesh sizes which will catch larval and small juvenile fish. Consequently, Lane's estimates of fish density ignored juveniles of the 70 fish species in the lake. Most juvenile fish are planktivorous[4], and although small, are more abundant than large fish; their relative consumption rates are also greater[5]. Therefore, they may significantly affect total piscine predation rates. Only predation by one fish, *Osmerus mordax*, was considered in her study. Consumption by other species was ignored because they were seldom caught in gill nets or were considered "inshore species". However, gill nets are highly selective for some species[6], and absence from these nets does not indicate absence from a system. Inshore species may also have access to pelagic plankton by undertaking diel migrations to the pelagic zone[7,8] or by locating plankton concentrated near the littoral by currents[9]. We have observed both types of behaviour in a zooplanktivorous fish, *Menidia audens* (W.W. and H.L., unpublished results).

(2) Prey consumption rates by fish were severely underestimated. Samples to estimate gut fullness and evacuation rates were taken at only three periods during 24-h cycles: significantly, none was taken during daylight periods. Consequently, feeding peaks may well have been missed. For example, our work with *Menidia* indicates that dawn and dusk feeding peaks would be largely missed with Lane's sampling regime and would result in an underestimate of consumption rates by at least 100%. Lane's data suggest that at least some feeding by *Osmerus* occurs during daylight, as on one of three sample dates, fish were 60% full at sunset. She also assumed a linear instead of an exponential model of gut evacuation and that feeding and gut evacuation are mutually exclusive events. These assumptions, coupled with infrequent sampling, can also lead to severe underestimates of consumption rates[10].

(3) Additionally, there are apparent difficulties in estimating invertebrate predation rates. Lane's previously published estimates of zooplankton predation rates[11,12] differ by more than one order of magnitude. Such differences could lead to considerable errors in interpreting the relative importance of vertebrate and invertebrate predation. We also question the statement that "*Cyclops* . . . perhaps selects prey more for their availability than for any other factor",[3] because prey morphology, size and behaviour contribute significantly to prey selection[13–15].

Lane's work has shown that invertebrate predators must exert an important evolutionary pressure on zooplankton community structure. Additionally, she has emphasized that the effects of fish on the zooplankton may often be indirect[14,16]. However, given the methodological difficulties listed above, we are unconvinced that fish have little effect, whether direct or indirect, on zooplankton communities.

WAYNE WURTSBAUGH

Department of Wildlife and Fisheries,
University of California,
Davis, California 95616, USA

HIRAM LI
JUDITH LI

Oregon Cooperative Fishery Research Unit,
Department of Fisheries and Wildlife,
Oregon State University,
Corvallis, Oregon 97331, USA

1. Hall, D. J., Threlkeld, S. T., Burns, C. W. & Crowley, P. H. *A. Rev. Ecol. Syst.* **7**, 177–208 (1976).
2. O'Brien, W. J. *Am. Scient.* **67**, 572–581 (1979).
3. Lane, P. A. *Nature* **280**, 391–393 (1979).
4. Nikolsky, G. V. *The Ecology of Fishes* (Academic, New York, 1963).
5. Brett, J. R. in *Fish Physiology* Vol. 8 (eds Hoar, W. S. *et al.*) 599–667 (Academic, New York, 1979).

0028–0836/81/340779—02$01.00